



**U.S. Department of Energy**  
**Office of River Protection**

**P.O. Box 450**  
**Richland, Washington 99352**

02-OSR-0047

Mr. Ron F. Naventi, Project Manager  
Bechtel National, Inc.  
3000 George Washington Way  
Richland, Washington 99352

Dear Mr. Naventi:

**CONTRACT NO. DE-AC-01RV14136 – INSPECTION REPORT IR-02-002 - SAFETY  
INTEGRATION ASSESSMENT**

This letter forwards the results of the Office of Safety Regulation inspection of the Bechtel National, Inc. (BNI) safety integration process, which was conducted from January 7-11, 2002. The inspectors identified one Finding, which is documented in the Notice of Finding (Enclosure 1).

Details of the inspection, including the Finding, are documented in the enclosed inspection report (Enclosure 2). The Finding resulted from the Contractor's failure to implement all Project Safety Committee (PSC) reviews required by the Integration Safety Management Plan (ISMP), Section 3.16.1.2, "Project Safety Committee. PSC reviews not conducted included: (1) identification, resolution, and implementation of recommendations and corrective actions resulting from audits, inspections, and various oversight processes, and (2) reports of management assessment findings. The OSR considers these reviews important for the Project because they provide a broad-based overview of the adequacy of the corrective action process necessary for the overall project.

You are requested to provide a written response to the Finding within 30 days, in accordance with the instructions provided in the Notice of Finding.

If you have any questions regarding this inspection, please contact me or Pat Carrier of my staff, (509) 376-3574.

Mr. Ron F. Naventi  
02-OSR-0047

Nothing in this letter should be construed as changing the Contract, DE-AC27-01RV14136. If in my capacity as the Safety Regulation Official, I provide any direction that your company believes exceeds my authority or constitutes a change to the Contract; you will immediately notify the Contracting Officer and request clarification prior to complying with the direction.

Sincerely,

OSR:JEA

Robert C. Barr  
Safety Regulation Official  
Office of Safety Regulation

Enclosures

cc w/encls:  
W. R. Spezialetti, BNI

## NOTICE OF FINDING

Standard 7, "Environment, Safety, Quality, and Health," of Contract DE-AC27-01RV14136, dated December 11, 2000, between Bechtel National, Inc. (the Contractor) and the U.S. Department of Energy (DOE), defined the Contractor's responsibilities under the Contract as they related to conventional non-radiological worker safety and health; radiological, nuclear, and process safety; environmental protection; and quality assurance.

Standard 7, Section (e)(2)(i) of the Contract required the Contractor to develop and implement an integrated standards-based safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained.

The Contractor submitted to DOE Office of River Protection (ORP) the Bechtel Integrated Safety Management Plan (ISMP), 24590-WTP-ISMP-ESH-01-001 Rev. 0b, which was approved by the DOE ORP and issued October 4, 2001.

The Contractor's ISMP Section 3.16.1.2, "Project Safety Committee," states in part, "The PSC reviews the management and performance of the River Protection Project-Waste Treatment Plant (RPP-WTP) nuclear, radiological, process, and occupational safety and environmental protection activities, ..."

During performance of an inspection of Safety Integration conducted January 7-11, 2002, at the Contractor's offices, the OSR identified the following:

Contrary to the above, the Contractor was not complying with Section 3.16.1.2, "Project Safety Committee" of the ISMP, in that the required PSC reviews listed below were not being performed. This example of failure to implement the ISMP, as described above, is considered a Finding (IR-02-002-01-FIN)

- Results from the Safety Improvement Program
- Identification, resolution, and implementation of recommendations and corrective actions resulting from nonconforming items or activities, incident investigations, audits and assessments, inspection and reviews, or emergency exercises
- Reports covering such topics as proposed RPP-WTP modifications, emergency exercises, and the implementation of findings from management assessments
- Performance indicators and trends of the RPP-WTP for worker, public, and environmental safety activities."

The Office of Safety Regulation (OSR) requests that the Contractor provide, within 30 days of the date of the cover letter that transmitted this Notice, a reply to the above Finding. The reply should include: (1) admission or denial of the Finding, (2) the reason for the Finding, if admitted, and if denied, the reason why; (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further Findings, and (5) the date when full compliance with the applicable commitments in your authorization bases will be achieved. Where good cause is shown, consideration will be given to extending the requested response time.

**U.S. DEPARTMENT OF ENERGY**  
Office of River Protection  
Office of Safety Regulation of the RPP-WTP Contractor

INSPECTION: SAFETY INTEGRATION ASSESSMENT

REPORT No.: IR-02-002

FACILITY: Bechtel National, Inc.

LOCATION: 3000 George Washington Way  
Richland, Washington 99352

DATES: January 7-11, 2002

INSPECTORS: J. Adams (Lead), Senior Regulatory Technical Advisor  
R. Griffith, Senior Regulatory Technical Advisor  
N. Hunemuller, Senior Regulatory Technical Advisor  
C. Norelius, Office of Safety Regulation Consultant

APPROVED BY: P. Carrier, Verification and Confirmation Official  
Office of Safety Regulation

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EXECUTIVE SUMMARY  
Safety Integration Assessment  
Inspection Report IR-02-002

## INTRODUCTION

This inspection of Bechtel National, Inc. (BNI) safety integration efforts covered the following specific areas:

- Adequacy of the Contractor's actions to manage the integration of safety throughout the organization (Section 1.2)
- Adequacy and effectiveness of the safety committee program to address safety issues at all levels of the Contractor's operation (Section 1.3)
- Adequacy and effectiveness of the Contractor's Safety Improvement Program (Section 1.4)
- Adequacy of safety integration into the design process (Section 1.5)
- Effectiveness of the program for developing and maintaining a safety culture. (Section 1.6)

## SIGNIFICANT OBSERVATIONS AND CONCLUSIONS

- The Contractor demonstrated an adequate commitment to safety integration during the design phase. The Contractor's management of integration of safety throughout the organization was effective. (Section 1.2)
- The Contractor had, in most cases, an effective Project Safety Committee (PSC) for the current phase of the project. However, two issues were identified 1) the failure to implement corrective actions in a timely manner (documented as a Finding in Inspection Report IR-02-001) and 2) the failure to follow the procedure implementing Integrated Safety Management Plan (ISMP) commitments for PSC responsibilities, which was documented as a Finding (IR-02-002-01-FIN) in this report. (Section 1.3)
- The Contractor had not documented a safety improvement program for the design phase of the project; however, after the inspectors brought this issue to the Contractor's attention a Corrective Action Request (CAR) was written. Resolution of this issue will be followed as an Inspector Follow-up Item. (Section 1.4)
- The Contractor had adequately implemented safety integration into the design process through multiple means. (Section 1.5)

- The Contractor's effort to instill in staff an adequate safety culture was effective.  
(Section 1.6)

## **SAFETY INTEGRATION ASSESSMENT**

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# SAFETY INTEGRATION ASSESSMENT INSPECTION REPORT

## 1.0 REPORT DETAILS

### 1.1 INTRODUCTION

In accordance with *the Design and Construction of the Hanford Tank Waste Treatment and Immobilization Plant (WTP) Contract*,<sup>1</sup> Standard 7: "Environment, Safety, Quality, and Health," Section (e)(2), the Contractor was required to develop and implement an integrated standards-based safety management program to ensure that radiological, nuclear, and process safety requirements were defined, implemented, and maintained. As a result, integrated safety management (ISM) was central to the WTP regulatory concept. There were several programs and related documents, which were referenced in the Contractor's Integrated Safety Management Plan (ISMP), including the Safety Requirements Document (SRD), the Quality Assurance Manual (QAM), the Hazard Analysis Report (HAR), and others. The ISMP described each of these separate programs, and provided an overview of how these programs would be integrated to provide an appropriate safety environment for the WTP Project. The ISMP was approved by the Office of Safety Regulation (OSR), and the Contractor was required to perform work according to the processes specified in the plan and implementing procedures.

It should be noted that the OSR inspection program is multifaceted in its approach to inspecting implementation of the ISMP; specifically, the program includes assessing quality assurance, configuration management, self-assessments and corrective action, design, standards selection process, training and qualification of personnel, authorization basis management, SRD design standard implementation, and as low as is reasonably achievable (ALARA) for the design program.

During this inspection, the inspectors reviewed integration of the Contractor's ISM program, safety oversight, design activities, and safety culture. Specifically, the inspectors assessed:

- The adequacy of the Contractor's actions to manage the integration of safety throughout the organization
- The adequacy and effectiveness of the safety committee program to address safety issues at all levels of the Contractor's operation
- The adequacy and effectiveness of the Contractor's Safety Improvement Program
- The adequacy of safety integration into the design process
- The effectiveness of the Contractor's program for developing and maintaining a safety culture.

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<sup>1</sup> Contract No. DE-AC27-01RV14136 between DOE and BNI, Inc., dated December 11, 2000.

The inspectors reviewed the Contractor's safety integration programs and implementing procedures against the Contractor's authorization basis (e.g., the ISMP, SRD, and the QAM). In addition, the inspectors reviewed records, interviewed staff, and observed related activities to determine if the Contractor was adequately establishing, implementing, and maintaining safety integration in accordance with the Contract requirements.

## **1.2 ADEQUACY OF THE CONTRACTOR'S ACTIONS TO MANAGE THE INTEGRATION OF SAFETY THROUGHOUT THE ORGANIZATION (INSPECTION TECHNICAL PROCEDURE (ITP) I-109)**

### **1.2.1 Inspection Scope**

The inspectors reviewed organization charts, policy statements, project implementation documents and procedures, and conducted interviews of managers and non-supervisory staff, to assess the Contractor's program for managing safety integration during the design and early construction phases of the project,

### **1.2.2 Observations and Assessments**

The inspector's interviewed the Project Manager (PM) to determine how the following AB requirements were being implemented: 1) Section 6.1.2 of the ISMP stated, "The flow down of ES&H responsibility and accountability starts with the Project Manager...and extends through the management and supervisory chain to each worker ...." 2) The Quality Assurance Manual, Policy Q.02-1, Section 3, stated, "The Project Manager is responsible for instilling a culture of excellence for safety and quality." The interview revealed that the PM used policies, procedures and his organizational structure to implement the above AB requirements. The PM had issued the following policy statements:

- Project Integrated Safety Management System (ISMS) Policy. This policy stated, "This ISMS systematically integrates safety into management and work practices at all project levels and incorporates ISMS core functions and guiding aspects of the ISMS. Each person on this project is responsible and accountable for safety."
- Waste Treatment Plant Health and Safety Policy. This policy was oriented towards employee safety on the project. The individual employee responsibility for safety was again stressed in this policy. It also stated that the WTP management team was committed to a "zero accident" performance philosophy.
- Management Constructability Policy Statement. This policy addressed the integration of procurement, engineering, construction, and operations in project planning, and noted that one element of this process should be improved safety.

In the flow down of responsibility, the Project Manager assigned the Director, Environmental, Safety and Health (ES&H), the responsibility for development, implementation, and integration of the safety management process. During an interview with the inspectors, the Project Manager expressed his view of the primary importance of safety on the project. He directed the

development of policies and programs to address the process of safety integration, and was clear in his expectations that safety was a behavior that was expected in all aspects of the work.

The inspectors interviewed the ES&H Director and reviewed the organization chart to assess how he had managed the integration of safety. The ES&H Director had several years of experience working in nuclear safety programs and with various levels of ISMS development and implementation prior to his current assignment. The organizational chart indicated that the ES&H Director had established a multi-tiered safety organization with environmental, industrial, and radiological, nuclear, and process safety (RNP) under separate managers. The RNP safety manager had safety analysis, regulatory safety, and radiological and fire safety under different managers. A similar split was observed for environmental safety. In addition, a separate project manager had just been established for Integrated Safety Manager and was in the process of establishing the ISMS. A preliminary copy of the ISMS Description was sent to ORP for information on December 20, 2001. It described the process and management systems that address ISM. The ISMP was considered a subset of the ISMS. Subcontractors were required to work under the Contractor's ISMS or their equivalent system subject to approval by the Contractor. Through this flow down and integrated management system, the inspectors concluded that a process was established to manage safety integration under the ES&H Director.

The inspector's review of interoffice memorandum from Tom Hash (President, Bechtel National Inc.) to Ron F. Naventi, dated May 7, 2001, indicated the Project Manager was held to a high level of accountability with regard to RPP-WTP safety performance. This memo provided evidence that safety performance is at the root of the Bechtel system of corporate values and indicated that safety starts at the top and flows down the organization. In the interview with the Project Manager, the inspectors learned that the PM was personally delivering this message to all new non-construction employees at their orientation. Construction staff had a separate training program for site access, which re-enforced the Project Manager's message.

The inspectors reviewed the Contractor's procedures to assess how the management of safety integration was being implemented. The procedure 24590-WTP-GPP-SREG-001\_0, *Project Safety Committee* provided an independent, integrated advisory committee to the PM on matters related to RNP and occupational safety, and environmental protection. The PSC provides recommendation for approval on the adequacy of intended actions and/or documentation and provides advice to the PM on matters related to safety. The procedure 24590-WTP-GPP-MGT-002\_0 "Management Assessment", dated September 28, 2001, provides for planning and conducting management assessments, and preparation of management assessment reports. The procedure 24570-WTP-GPP-QA-206A\_0, "Stop Work", dated September 28, 2001, provides for the ability of any member of the Contractor's organization to stop work if there is a safety issue needing immediate resolution. Interviews with managers and non-supervisory personnel indicated they understood the stop work procedure and felt comfortable with using the authority when necessary. The inspectors concluded that the Contractor had provided processes for reviewing safety related products, providing for self-assessment to determine when processes were not being implemented or working correctly, and for stopping work when necessary.

Hence, management of the integration of safety was accomplished through a variety of mechanisms—policy statements as described above, project organization which integrates safety, implementing procedures, an oversight assessment process, and safety meetings/ job assignments/ performance appraisals (detailed in later sections of the report).

### 1.2.3 Conclusions

The Contractor's management of the integration of safety throughout the organization was considered adequate. The Project Manager had established policies and designated the responsible individual for the management of safety integration. The Contractor had established and implemented policies, processes, and procedures consistent with management's stated expectations. These management tools provided a uniform commitment toward the integration of safety in all aspects of the program, and to the expectation that all individuals would work safely.

## 1.3 EFFECTIVENESS OF THE SAFETY COMMITTEE PROGRAM (ITP I-109)

### 1.3.1 Inspection Scope

To assess the implementation and effectiveness of the Safety Committee Program for the current stage of the project, the inspectors reviewed the Contractor's ISMP, implementing procedures, and associated records in this area. In addition, the inspectors interviewed selected management and committee members and attended the PSC meeting held during the inspection.

### 1.3.2 Observations and Assessments

The inspectors reviewed implementing procedure 24590-WTP-GPP-SREG-001\_0, *Project Safety Committee*, deficiency report (DR) 24590-WTP-DR-QA-01-048, and meeting minutes associated with the Safety Committee Program, to assess the implementation of the Executive Committee and the Project Safety Committee (PSC). Additionally, interviews were conducted with the Project Manager, the PSC Chair and Co-Chair, and OSR personnel to verify the effectiveness of the Safety Committee Program

The ISMP Section 3.16.1.1 requires the Contractor to have an Executive Committee. The PSC Meeting Minutes of September 5, 2001, showed the PSC had determined that the Executive Committee had not been formed. The Contractor initiated DR-QA-01-048, dated September 5, 2001 to document this deficiency. Subsequently, the Contractor ES&H organization performed a gap analysis, dated January 2, 2002, and determined that the DR-QA-01-048 had not been resolved. Corrective Action Report 24590-WTP-CAR-QA-01-009, dated December 27, 2001, documented the failure to resolve the deficiency and the continued need for resolution. A Finding (IR-02-001-01 FIN) was documented in Inspection Report IR-02-001, *Self Assessment and Corrective Action Inspection Report*, for failure to implement corrective actions in a timely manner as required by the Contractor's Quality Assurance Manual (QAM) Policy Q-16-1. "Corrective Actions."

The ISMP Section 3.16.1.2 requires the Contractor to have a Project Safety Committee. The inspectors compared the functions of the PSC, as listed in Section 3.2 of the *Project Safety Committee* procedure, to activities recorded in PSC approved meeting minutes, to verify all the functions of the PSC had been implemented. The inspectors determined the PSC was not reviewing the following as required by the procedure:

- Results from the Safety Improvement Program,
- Identification, resolution, and implementation of recommendations and corrective actions resulting from nonconforming items or activities, incident investigations, audits and assessments, inspection and reviews, or emergency exercises,
- Reports covering such topics as proposed RPP-WTP modifications, emergency exercises, and the implementation of findings from management assessments, and
- Performance indicators and trends of the RPP-WTP for worker, public, and environmental safety activities.

Interviews with the PSC Chair and Co-Chair confirmed these items were not being reviewed. Based on the inspectors determination, the Contractor documented this deficiency in 24590-WTP-CAR-QA-02-007, dated January 10, 2002. The failure to follow the PSC procedure, which implemented the commitments of the ISMP, was considered a Finding (IR-02-002-01-FIN).

The inspectors reviewed PSC meeting minutes and discussed associated PSC-approved Contractor ABCN submittals with the assigned OSR reviewers, to determine the effectiveness of the PSC reviews. The inspectors assessed the following: 1) proposed changes to the Authorization Basis, 2) authorization request submittals, and 3) the ISM process standards set for evidence of effective PSC review.

From review of the meeting minutes from September 5, 2001, through December 12, 2001, the inspectors determined the PSC adequately controlled the review, approval, and subsequent revision, of the Limited Construction Authorization Request (LCAR). From review of meeting minutes relative to the proposed ISM process standards set, the inspectors determined the PSC actions relative to considering ISM process standards were adequately documented, however, it was noted that no outside technical reviews (comparable to the specialist reviews discussed in the design process) were utilized other than for ALARA purposes.

To evaluate the effectiveness of the PSC review of AB changes, the inspectors: (1) reviewed meeting minutes to understand the review process used by the PSC to determine no reduction in commitment or safety; (2) interviewed the Chair and Co-Chair of the PSC for what processes were utilized to determine the accuracy of the presenters information; and (3) discussed with assigned OSR reviewers the results of recent submittal reviews. The inspectors determined from meeting minutes that the PSC does ask the presenter if any reduction in commitment scope or safety has resulted from the change. However, it was determined from the PSC secretary that the PSC Chair and the PSC Secretary had set a policy that no independent PSC technical review is required except for ALARA related changes. The discussion with the OSR reviewers of recent ABCN submittals, determined some recent PSC-approved ABCN submittals were not effectively reviewed for reduction in commitment, and the OSR reviewers had informed the Contractor of the need to resolve these inadequacies.

The inspectors attended a PSC meeting to observe the effectiveness of interaction between the PSC members. The inspectors noted the following:

- Senior Managers for the Project were present and all major departments were represented.
- The meeting was conducted in accordance with the PSC charter and procedure except as noted in this inspection report.
- The agenda was followed with an effective exchange of questions and answers.
- The use of the ISM tailoring process was discussed relative to the tailoring of safety standards.
- Accident Prevention Council minutes were reviewed and the need for management support of the Council's recommendations were stressed. \*
- An action item was identified to ensure the PSC addressed all functions for which PSC was accountable per procedure. \*
- An agenda item was identified for the next meeting to address whether the Safety Improvement Program should be a stand-alone program or incorporated into the ISM System Description. \*

The inspectors concluded that the PSC was conducting meetings per the PSC charter and procedure except as noted in this inspection report and the agenda reflected a response to OSR issues, which has been raised during the conduct of the inspection. The above starred (\*) items are actions taken by the PSC in direct response to OSR review issues that were de-briefed to the Contractor during the assessment.

### **1.3.3 Conclusions**

The inspectors found evidence that the Contractor had, in most cases, an effective PSC for the current phase of the project. However, two issues were identified (1) the failure to implement corrective actions in a timely manner (documented as a Finding in Inspection Report IR-02-001) and (2) the failure to follow procedure implementing ISMP commitments for PSC responsibilities, which was documented as a Finding (IR-02-002-01-FIN) in this report.

## **1.4 ADEQUACY AND EFFECTIVENESS OF THE CONTRACTOR'S SAFETY IMPROVEMENT PROGRAM (ITP I-109)**

### **1.4.1 Inspection Scope**

The inspectors reviewed the Contractor's procedures and records and interviewed selected Contractor staff and management to assess the adequacy and effectiveness of the Contractor's Safety Improvement Program at the current stage of the project's design process.

### 1.4.2 Observations and Assessments

ISMP Section 3.16.2 requires the Contractor to have a Safety Improvement Program (SIP), which is developed and implemented by the PSC. The inspectors reviewed the procedure, *Project Safety Committee*, reviewed meeting minutes of the PSC, and conducted interviews with the PSC Chair/Co-Chair to assess the implementation and effectiveness of the Safety Improvement Program. The Project Manager was also interviewed to assess the implementation of the SIP.

The inspector's interview with the Project Manager indicated the project was implementing safety improvements and that the SIP was not formally documented. Staff interviews demonstrated/revealed that safety was emphasized as an individual responsibility and was a high priority.

From the review of the *Project Safety Committee* procedure, the inspectors determined the PSC was required to review the results of the SIP; however, the inspector's review of PSC meeting minutes, and the interview with the PSC Chair and Co-Chair, indicated no SIP results had been reviewed. Based on this and the PM statement, the inspectors determined no formal SIP had been developed and implemented by the PSC, and SIP results were not being reviewed by PSC as required by the ISMP and the procedure, respectively.

The inspectors also reviewed the Contractor's proposed revision (Section 3.16.2) of the ISMP as submitted in 24590-01-0008, "Integrated Safety Management Plan", dated October 1, 2001. This proposed revision indicated the Contractor's Radiological, Nuclear, and Process (RNP) Safety Improvement Program would be developed and implemented during the operations phase of the project and deleted reference to the non-radiological safety improvement program during the design and construction phases. If this revision had been previously approved by the OSR, the Contractor would have been compliant with ISMP Section 3.16.2.

Following discussions with the inspectors on the lack of compliance to ISMP Section 3.16.2, the Contractor initiated 24590-WTP-CAR-QA-02-007, dated January 10, 2002, which stated "Though recognizing that many pieces of a safety improvement program exist, DOE inspectors also cited BNI for failure to clearly develop and implement the Safety Improvement Program ...". The inspectors determined that the resolution of the CAR, which stated "PSC should clearly define what is intended to be the Safety Improvement Program and record this in its minutes" was adequate in that this section would define what the PSC obligations were with respect to the SIP.

### 1.4.3 Conclusions

The Contractor had not documented a safety improvement program for the design phase of the project; however, after the inspectors brought this issue to the Contractor's attention, CAR-02-007 was written. This is not considered a finding because of the pending submittal, which, if approved, maintains the Contractor in compliance for the Safety Improvement Program. Resolution of this issue will be followed as an Inspector Follow-up Item (IR-02-002-02-IFI). The Contractor did appear to have an informal process, which emphasized safety as a high priority.

## **1.5 ADEQUACY OF SAFETY INTEGRATION INTO THE DESIGN PROCESS (ITP-109)**

### **1.5.1 Inspection Scope**

The inspectors interviewed Contractor engineering, commissioning and training (C&T), ES&H, and process technology management and personnel and reviewed project plans, procedures, design documents, and CARs. These activities were intended to verify:

- (1) Facility and system work was being performed with due consideration for the prevention and mitigation of risks.
- (2) Designs were accompanied by operation and maintenance philosophy documents for each area of the facility.
- (3) Flow diagrams and documents addressed appropriate aspects of design and incorporated input from the process hazards analysis (PHA) teams, which included representatives from operations, reliability, and relevant technical disciplines.
- (4) Human factors specialists were involved in the design review such that interfaces between the operating personnel and the WTP facility were closely monitored, and that good human factors and ergonomic practices were followed.

### **1.5.2 Observations and Assessments**

#### **1.5.2.1 Risk Prevention and Mitigation**

The inspectors conducted interviews with Contractor personnel and reviewed project documentation to verify that facility and system design work was being performed with due consideration for the prevention and mitigation of risks. This included the assessment of RAMI into the design, the use of specialists to provide design input and review, and the existence of procedures to provide consistency in the design review process.

The inspectors interviewed the Manager of Engineering Technology to assess the Contractor's approach to prevention and mitigation of the radiological and chemical hazards risks associated with facility chemical processes. The Contractor's approach to risk prevention and mitigation in design activities was implementation of the project ISM process. The inspectors reviewed the project procedure (24590-WTP-GPP-SANA-002B) and design guide (24590-WTP-GPG-SANA-002) for the ISM process and interviewed ES&H personnel to assess the effectiveness of the ISM process to prevent and mitigate design-related risk. The inspectors determined that the ISM process was formal, comprehensive, and effective in identifying the risks associated with the project design and control strategies for preventing or mitigating these risks. This included the active participation of cognizant engineering design personnel as members of the Preliminary Hazards Analysis (PHA) teams performing hazards analysis, control strategy development, and selection of implementing codes and standards. This information was appropriately documented in the project's Standards Identification Process Database (SIPD) for reference and use in ongoing design activities. No deficiencies were identified.

The inspectors interviewed engineering management to assess the implementation of RAMI into the design. A RAMI group was formed in the systems engineering organization, separate from the engineering discipline groups, to ensure consistency of RAMI data used by the design disciplines and the ES&H organization for ISM activities. Project RAMI data was obtained from a variety of sources, including the Savannah River RAMI database, the Institute of Nuclear Power Operations (INPO), and the Institute of Electrical and Electronic Engineers, Inc. (IEEE). The cognizant engineer/designer and/or engineering supervisor made initial decisions concerning the need to incorporate redundancy into the design to achieve the necessary system reliability. This decision was based on the importance of the system/component to the facility safety basis and depended on the knowledge of the individual(s). Separately, the systems engineering group was developing an operations research (OR) model to assess the RAMI aspects of the evolving design. The OR model was used primarily as a tool to confirm the decisions of the design disciplines. The Contractor intended to perform sensitivity runs using the OR to assess and enhance the RAMI aspects of the project design. Inspectability was being achieved primarily through the design review process and the three-dimensional plant model. The inspectors considered the Contractor's efforts in the area of RAMI commendable, and no deficiencies were identified. As discussed later, the Contractor had effectively organized the C&T organization such that the evolving project design was being evaluated for RAMI considerations on a real-time basis.

The inspectors interviewed engineering managers and staff and reviewed project procedures to assess the Contractor's approach to obtaining the services of specialists to provide input into the facility design. The project was using the document review request (DRR) process to solicit review of design output documents by appropriate specialists/specialty groups. The engineering designer and/or supervisor had the discretion to decide who/what groups should be included on the DRR. This was confirmed in subsequent interviews with design leads and designers in the mechanical systems group. Design input for the selection of vessel and piping systems materials, was provided by a separate materials group within the mechanical systems organization. The project was also using the services of Bechtel corporate specialists to provide reviews or provide design input, as requested. A design control checklist (DCL) from procedure 24590-WTP-3DP-G04B-00034, "Off-Project Design Review," was used to obtain the input from the Bechtel corporate specialists. The inspectors concluded that the Contractors had an adequate process for involving specialists in the evolving facility design. No deficiencies were identified.

The inspectors interviewed engineering management to determine if procedures were used to provide consistency in the design review process. The inspectors determined that several project engineering documents (24590-WTP-3DP-G04B-00034, "Off-Project Design Review;" 24590-WTP-3DP-G04B-00027A, "Design Verification;" and 24590-WTP-PL-ENG-01-004, "Design Process Plan and Description") were used to control and provide formality to the Contractor's design review process. These documents were reviewed and the inspectors determined that the design review process had adequate control and formality.

#### 1.5.2.2 Operations and Maintenance Philosophy Documents

The inspectors interviewed Contractor management and staff and reviewed operations and maintenance (O&M) philosophy documents and project design documentation to assess the use of operations and maintenance philosophy documents in project design activities.

The inspectors interviewed Contractor management and staff and determined that project operations and maintenance philosophy documents currently consisted of the Operations Requirements Document (ORD) (24590-WTP-RPT-OP-01-001), Functional Specification (FS, 24590-WTP-PL-G-01-001), and Basis of Design document, (BOD, 24590-WTP-DB-ENG-01-001). The inspectors reviewed the ORD and determined that it included aspects of operations and maintenance philosophies and topics that will facilitate designing the WTP. This set of Contract documents (i.e., ORD, FS, and BOD) was provided to and used by the project engineering disciplines.

The inspectors interviewed the project C&T Manager and determined that C&T operations and maintenance specialists were assigned to the engineering disciplines. Through these resident assignments, the C&T specialists provided real-time operations and maintenance input, as well as RAMI input, to project design activities. This included review of all stages of design output documentation and participation in both informal and formal design reviews. The inspectors considered this to be strength of the Contractor's approach to integrating safety into design.

#### 1.5.2.3 Technical Organization and Process Hazards Analysis Team Review of Design

The inspectors conducted interviews with Contractor personnel and reviewed project documentation to assess the Contractor's approach to ensuring consistency in design activities, internal review of design output documents, and involvement of the ISM teams in evaluating the safety aspects of the design.

BNI implemented a discipline approach, rather than the previous project approach, to conduct and control facility engineering and design activities. The Deputy Engineering Manager (DM) for each discipline was responsible for ensuring consistency within that discipline. This ensured consistency in the discipline design activities throughout project facilities. The setting of engineering policy and ensuring consistency at the highest level of design rested with the Engineering Manager. In addition, design consistency was being achieved by engineering compliance with the relevant requirements from the ORD. During the interviews of engineering management, the inspectors determined that engineering was also looking to the operations organization to provide input on design consistency within the project. This was accomplished by operations involvement through the document review request (DRR) process, participation in design reviews, and participation as members of the ISM teams. The decision of when to involve operations in the DRR process was at the discretion of engineering personnel and not driven by a procedural requirement. During subsequent interviews with mechanical systems design leads and designers, the inspectors determined that the operations organization was included on the DRRs for all design documentation. This was confirmed by review of DRRs, as discussed below.

The Contractor was using the DRR process to solicit review and comments from project design and other organizations for design output documentation. The inspectors reviewed Contractor design documentation packages for five (alpha level revisions) piping and instrumentation diagrams (P&IDs), including the DRRs requesting review and comments from the operations, C&T, and ES&H organizations. In addition, these design packages were reviewed against the requirements of the ORD, Sections 5, "Operational Philosophy;" 9, "Maintenance;" 10, "Facility Layout;" 14.2, "Process Vessels;" 14.3, "Piping;" and 18, and "Waste Management." Signed DRRs were identified for each design document reviewed by the inspectors, except from C&T

for two of the P&IDs. However, the inspectors were provided a copy of the electronic mail sent to the C&T representative providing notice of the missing form and requesting response. The inspectors considered the DRR process to be working properly. No deficiencies were identified.

The inspectors reviewed five design documentation packages to verify that the ISM teams were addressing the design components from a safety aspect. As discussed above, this included review of the associated DRRs. The inspectors interviewed ES&H safety leads and determined the ES&H review documented on the DRRs indicated that the appropriate safety lead reviewed the revised drawing and assessed if the changes were significant enough to warrant reassembling the ISM team (for the purpose of performing hazards and operability analyses, reconsideration of preferred control strategies, and/or reconsideration of selected implementing codes and standards). If required, the ISM team would re-perform these activities using the project ISM procedure and design guide using representatives from ES&H, plant operations, and the appropriate engineering design disciplines. The inspectors determined that the Contractor was adequately integrating safety into design activities through the DRR and ISM processes and no deficiencies were identified.

#### 1.5.2.4 Human Factors in Design

The inspectors conducted interviews with Contractor personnel and reviewed project documentation to assess the involvement of human factors (HF) specialists in project design activities and the procedures or criteria to ensure consistency and completeness in human factors reviews.

The inspectors interviewed the project's Human Factors Specialist (HFS), the C&T Manager, and the Area Operations Lead Manager to assess HF specialist's involvement in project design activities. The involvement of the HFS in the ongoing project design was previously assessed during OSR's Design Process Inspection conducted October 29 through November 6, 2001. During that assessment, the inspectors identified that the HFS was performing this function on a consulting basis. The HFS attended various design review meetings, identified design improvement opportunities, and provided recommendations to address HF factors issues. Design engineering personnel consulted the HFS on problems and solutions on an informal basis. The Contractor was still performing HF reviews in this manner at the time of this Safety Integration inspection. The Contractor had made progress in the development of a formal HF program. A HF procedure geared toward engineering/design activities was under development. The inspectors reviewed the table of contents and determined the procedure was intended to be comprehensive and would include a series of flow sheets and checklists to guide and document the performance of HF reviews. Other elements of the developing HF program identified to the inspectors included classroom training of engineering design discipline personnel, development of a management policy (or similar document stating the Contractor's commitment to HF) in the design of the facility, a HF deficiency database, and management assessments. The classroom training was to include each engineering discipline, and involve advanced HF training such that those trained could serve as a HF resource for that discipline.

The inspectors interviewed the C&T Manager and the Area Operations Lead Manager to assess the commitment of the project management team to the developing HF program. The inspectors determined that the Contractor's management team was committed to the HF program under development. This was realized by the involvement of the Engineering Manager, Deputy

Engineering Managers, and the ES&H Manager with the development of the ORD. The ORD included many of the HF concepts that were to be addressed in the developing HF program and procedure. It was also identified to the inspectors that C&T operations specialists were heavily involved with ongoing project design activities and providing input consistent with the HF concepts to be incorporated into the HF program/procedure. The benefits of the addition of the HF program would be to add formality and ensure thorough and consistent HF evaluations of the evolving facility design.

The inspectors learned that the Contractor issued a CAR because of inconclusive evidence of “consistent and complete” HF input into the design. The CAR noted that the Contractor had no HF procedure or design guide for the project. Although developed just prior to the inspection, the CAR reflected a proactive attitude toward the resolution of this issue.

Based on the above, the inspectors were satisfied that the project human factors efforts were consistent with the current stage activities of project design and AB commitments.

### **1.5.3 Conclusions**

The inspectors concluded the following:

- (1) The Contractor was performing and documenting design activities, which reflected adequate consideration of a means to prevent and/or mitigate process-related risks, primarily through implementation of the formal ISM process.
- (2) The Contractor had developed appropriate operations and maintenance philosophy documents to direct those aspects of the design process. These documents included the Operations Requirements Document, Functional Specification, and the Basis of Design Document.
- (3) Design documentation was uniformly and consistently generated due, in large part, to the Contractor’s use of a discipline-based design organization rather than a project-based organization.
- (4) The ISM was formalized in a project procedure and design guide and was implemented such that project design documentation was evaluated for impact to completed hazards analysis, identified control strategies, and implementing codes and standards. The ISM process included requirements to reassemble the ISM (process hazards analysis) teams when necessary and to involve the appropriate cognizant personnel from the ES&H, Engineering, and C&T organizations.
- (5) The Contractor’s HFS was still performing work in a consultative manner. However, efforts were underway to develop and implement a formal HF program. The Contractor HF plans were reflective of a program that should be able to satisfy the HF commitments documented in the ISMP revision currently being reviewed within OSR.

## **1.6 EFFECTIVENESS OF PROGRAM TO ACHIEVE A SAFETY CULTURE (ITP I-109)**

### **1.6.1 Inspection Scope**

The inspectors interviewed management and staff, reviewed position descriptions, and evaluated the Contractor's program for achieving safety integration to assess the effectiveness of the Contractor's efforts to instill in staff an adequate safety culture.

### **1.6.2 Observations and Assessments**

The inspectors verified that steps were being taken on an ongoing basis to develop and maintain a safety/quality culture. For example:

- (1) The inspectors determined policy statements on integrated safety management and health and safety had been issued.
- (2) The inspectors determined expectations and performance standards had been developed to ensure that individuals take responsibility for safety and quality in their work. These expectations and standards were communicated to employees. For example, the "New Employee Orientation Manual" communicated expectations and included sections on integrated safety management, design safety, employee concerns, quality assurance, and the Price Anderson Amendment Act as well as sections on conventional workplace safety. The inspectors also determined there were procedures, for example "Safety Communication," and "Stop Work," that helped to achieve these expectations.
- (3) The inspectors determined a variety of means of communication had been used to 'set the tone' for a safety culture. Bulletin boards displayed safety information required by laws and information posted at the individual initiative of employees. Safety posters and displays expressing management's goals and expectations were also located in other prominent locations. Management and staff confirmed that nearly all meetings began with a safety topic. Employees indicated that corrective actions had been promptly taken in response to safety concerns.
- (4) The inspectors reviewed position descriptions and observed they contained elements that addressed personal responsibility for safety and quality in job performance. For example, the job description of the ES&H Manager said, among other things, "Leads development of a robust safety culture and a strong conventional safety program." Other examples included job descriptions, which included elements for engineers to provide supporting analyses and calculations for safety/hazard evaluations, supervisors to review adherence to technical specifications and safety requirements, and managers to provide direction and monitor performance with respect to risk management, quality, and safety objectives.
- (5) Based on interviews, the inspectors determined safety and quality issues had been discussed in job performance reviews. Annual review forms specifically included safety as an area to be assessed. Individuals interviewed indicated they had a personal responsibility for safety in their work. Personal responsibility manifested itself in routine

job responsibilities. Employees acknowledged that, in addition to required reading of procedures, they regularly received and read safety e-mail and electronic newsletters. Employees raised and presented safety topics for meetings and indicated there was an atmosphere of open communication with respect to bringing safety concerns to management's attention.

### **1.6.3 Conclusions**

Based on the inspectors' interviews of management and staff, review of position descriptions, and evaluation of the Contractor's policies, procedures, and practices for achieving safety integration, the inspectors determined the Contractor's efforts have been effective in instilling in staff an adequate safety culture.

## **2.0 EXIT MEETING SUMMARY**

The inspectors presented the inspection results to members of Contractor management at an exit meeting on January 11, 2002. The Contractor acknowledged the observations and conclusions presented.

The inspectors asked the Contractor whether any materials examined during the inspection should be considered limited rights information. Limited rights information was identified and returned.

## **3.0 REPORT BACKGROUND INFORMATION**

### **3.1 PARTIAL LIST OF PERSONS CONTACTED**

Steve Lynch, Manager of Engineering Technology  
 Denise Brooks, Human Factors Specialist  
 Neil Brosee, Manager of Commissioning & Training  
 Jim Wilson, Area Operations Lead Manager  
 Kim Auclair, Manager of Systems Engineering  
 Rodney Blackmon, Risk Management Lead  
 Eric Isern, Mechanical Systems Lead  
 Richard Tometczak, Mechanical Systems Engineer  
 Frank Holgado, Mechanical Systems Engineer  
 John Hinckley, LAW Hazards and Safety Analysis Lead  
 E. Smith, Safety Program Engineer  
 Mark Platt, Safety Program Lead  
 Garth Duncan, Deputy EM, Mechanical  
 Charlie Herbert, Training Coordinator, Construction  
 Scott Marko, Industrial Hygienist  
 Ricardo Pingo, Design Engineer  
 Ron Naventi, WTP Project Manager  
 Fred Beranek, Manager, Environmental, Safety, and Health

Bill Poulson, Operations Manager  
 Miriam McMillan, Senior Mechanical Designer  
 Ed Donoso, Design Supervisor, Mechanical Systems  
 Suzanne Kirk, Deputy Mechanical Systems Manager  
 John Duke, Safety and Licensing Engineer  
 Lew Dougherty, Safety and Licensing Engineer

### **3.2 LIST OF INSPECTION PROCEDURES USED**

Inspection Technical Procedure I-109, "Safety Integration Assessment"

### **3.3 LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

#### **3.3.1 Opened**

IR-02-002-01-FIN	Finding	Verify Contractor implements all applicable functions of ISMP Section 3.16.1.2 "Project Safety Committee," (Section 1.3.2)
IR-02-002-02-IFI	Follow-up Item	Verify Contractor completes the closeout of CAR-02-007 and determines the results of the OSR review of ABCN as it relates to the requirement for a RNP Safety Improvement Program. (Section 1.3.2)

#### **3.3.2 Closed**

None

#### **3.3.3 Discussed**

None

### **3.4 LIST OF DOCUMENTS REVIEWED DURING THE INSPECTION**

Drawings/Design Input Memoranda/Document Review Requests:

24590-LAW-M6-RLD-00001, Rev. B, "Radioactive Liquid Waste Disposal System Plant Wash & SBS Condensate Collection"

24590-LAW-M6-RLD-00002, Rev. A, "Radioactive Liquid Waste Disposal System C3/C5 Drains and Sump Collection"

24590-LAW-M6-RLD-00003, Rev. A, "Radioactive Liquid Waste Disposal System C3/C5 Floor Drains Collection"

24590-LAW-M6-NLD-00001, Rev. B, "Non-Radioactive Liquid Waste Disposal System C1/C2 Drains/Sump Collection"

24590-LAW-M6-NLD-00002, Rev. A, "Non-Radioactive Liquid Waste Disposal System C1/C2 Floor Drains Collection."

Corrective Action Reports:

CAR No. 24590-WTP-CAR-QA-01-042, Revision 0, dated December 28, 2001

CAR No. 24590-WTP-CAR-QA-02-007, Revision 0, dated January 10, 2002

CAR No. 24590-WTP-CAR-QA-01-009, Revision 0, dated December 27, 2002

24590-WTP-DR-QA-01-048, Revision 0, dated September 5, 2001.

Procedures Reviewed

24590-WTP-GPP-MGT-002\_0 "Management Assessment", dated September 28, 2001

24590-WTP-GPP-QA-206A\_0, "Stop Work," dated September 28, 2001

24590-WTP-GPP-SREG-001\_0, "Project Safety Procedure", dated Sept. 28, 2001

24500-WTP-GPP-SIND-005\_0, "Lessons Learned", dated September 28, 2001

24570-WTP-GPP-QA-206A\_0, "Stop Work", dated September 28, 2001

Other Documents Reviewed

24590-WTP-GPG-SIND-002\_0, "Safety Communication," dated July 10, 2001

24590-WTP-GPG-SIND-004\_0, "Behavior Based Training," dated September 28, 2001

24590-WTP-G63-SIND-001\_0, "Health and Safety Policy", dated September 28, 2001

24590-WTP-G63-MGT-005\_0, "Management Constructability Policy Statement", dated November 29, 2001

24590-WTP-PL-MG-01-006\_0, "Project Implementation Plan," dated January 9, 2002

24590-01-0008, "Integrated Safety Management Plan", dated October 1, 2001

24590-WTP-G63-MGT-001\_01, "Project Integrated Safety Management System Policy," dated June 3, 2001

24590-WTP-RPT-OP-01-001, Revision 0, "Operations Requirements Document," dated November 8, 2001

24590-WTP-PL-G-01-001, Revision 0, "Functional Specification," dated October 22, 2001

24590-WTP-DB-ENG-01-001, Revision A, "Basis of Design document," dated August 20, 2001

24590-WTP-PL-ENG-01-004, Revision 0, "Design Process Plan and Description," dated November 2, 2001

24590-WTP-ISMSD-ESH-01-001, Rev. D, "WTP Project Integrated Safety Management System Description," transmitted by CCN: 026089, dated December 26, 2001, A. R. Veirup to M.K. Barrett, "Contract No. DE-AC27-01RV14136 Transmitted for Information: Preliminary Integrated Safety Management System Description Document"

24590-WTP-G63-SIND-001\_0, Policy: "River Protection Project-Waste Treatment Plant Health & Safety Policy," dated September 28, 2001

24590-WTP-GPP-GAA-PSR01, Revision 0, "Project Support Request (PSR)," dated December 24, 2001

24590-WTP-GPP-PADC-003, Revision 0, "Internal Review and Approval of Documents," dated September 5, 2001

24590-WTP-GPP-PT-003A, Revision 0, "Technical Programmatic Risk Management," dated September 7, 2001

24590-WTP-GPP-SANA-002B, Rev. 0, "Hazard Analysis, Development of Hazard Control Strategies, and Identification of Standards," dated September 28, 2001.

24590-WTP-GPG-SANA-002, Rev. 0, "Integrated Safety Management," dated September 28, 2001.

24590-WTP-GPG-SANA-003, Revision 0, "Reliability, Availability, Maintainability, and Inspectability (RAMI) Program for the Waste Treatment Plant," dated September 28, 2001

24590-WTP-3DP-G04B-00027A, Revision 0, "Design Verification," dated September 5, 2001

24590-WTP-3DP-G04B-00034, Revision 0, "Off-Project Design Review," dated October 8, 2001

Interoffice Memorandum, File No. TFH-01-267, "BNI Safety Improvement Plan," from Tom Hash to Adrian Zaccaria, dated May 7, 2001

Letter, "2001, A year of progress," from Ron Naventi to Fellow employees, including the attached brochure, "2001 Progress, Glass in 2007," dated December 2001

Safety Integration Gap Analysis, dated January 2, 2002

New Employee Orientation Manual, not dated

Various safety information posted on bulletin boards, displays, and e-mailed to WTP employees

Various job descriptions

Annual review forms.

## 4.0 LIST OF ACRONYMS

ABCN	Authorization Basis Change Notice
ALARA	as low as reasonably achievable
BNI	Bechtel National, Inc.
BOD	Basis of Design document
BOF	Balance of Facility
CAR	Corrective Action Report
C&T	Commissioning and Training
DCL	Design Control Checklist
DIM	Design Input Memorandum
DM	Deputy Engineering Manager
DOE	U. S. Department of Energy
DR	Deficiency Report
DRR	Document Review Request
ELD	Equipment Location Drawing
ES&H	Environmental, Safety and Health
FMEA	Failure Modes and Effects Analysis
FS	Functional Specification
GA	General Arrangement
HAR	Hazard Analysis Report
HF	Human Factors
HFS	Human Factors Specialist
HLW	High Level Waste
IEEE	Institute of Electrical and Electronic Engineers, Inc.
IFI	Inspection Follow-up Item
INPO	Institute of Nuclear Power Operations
ISM	Integrated Safety Management
ISMP	Integrated Safety Management Plan
ITP	Inspection Technical Procedure
ITS	important-to-safety
LAW	Low Activity Waste
LCAR	Limited Construction Authorization Request
MCR	Main Control Room
MHD	Mechanical Handling Diagram
NPH	Natural Phenomena Hazard
ORD	Operations Requirements Document
ORP	Office of River Protection
OR	Operations Research

OSR	Office of Safety Regulation
PDC	Project Document Control
P&ID	Piping and Instrumentation Diagram
PHA	Preliminary Hazards Analysis
PSAR	Preliminary Safety Analysis Report
PSC	Project Safety Committee
PT	Pretreatment
PTF	Pretreatment Facility
QA	Quality Assurance
QAM	Quality Assurance Manual
QL	Quality Level
RAMI	Reliability, Availability, Maintainability, and Inspectability
RL	Richland Operations Office
RNP	Radiological, Nuclear and Process
RPP-WTP	River Protection Project- Waste Treatment Plant
SIPD	Standards Identification Process Database
SRD	Safety Requirements Document

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